SEQUENCE LISTING

<110> Toyota Jidosha Kabushiki Kaisha

<120> Method of controling Ethanol production

<130> PCTJP20007 (TSN2002-299-WO-00)

<140>
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<150> JP2002-65880
<151> 2002-03-11

<160> 39

<170> PatentIn Ver. 2.1

<210> 1

<211> 332

<212> PRT

<213> Bovine

<400> 1

Met Ala Thr Leu Lys Asp Gln Leu Ile Gln Asn Leu Leu Lys Glu Glu

1 5 10 15

His Val Pro Gln Asn Lys Ile Thr Ile Val Gly Val Gly Ala Val Gly

20 25 30

Met Ala Cys Ala Ile Ser Ile Leu Met Lys Asp Leu Ala Asp Glu Val

35 40 45

Ala Leu Val Asp Val Met Glu Asp Lys Leu Lys Gly Glu Met Met Asp

50 55 60

Leu Gln His Gly Ser Leu Phe Leu Arg Thr Pro Lys Ile Val Ser Gly

65 70 75 80

Lys Asp Tyr Asn Val Thr Ala Asn Ser Arg Leu Val Ile Ile Thr Ala

85 90 95

Gly Ala Arg Gln Gln Glu Gly Glu Ser Arg Leu Asn Leu Val Gln Arg

100 105 110

Asn Val Asn Ile Phe Lys Phe Ile Ile Pro Asn Ile Val Lys Tyr Ser

115 120 125

Pro Asn Cys Lys Leu Leu Val Val Ser Asn Pro Val Asp Ile Leu Thr

130 135 140

Tyr Val Ala Trp Lys Ile Ser Gly Phe Pro Lys Asn Arg Val Ile Gly
145 150 155 160

Ser Gly Cys Asn Leu Asp Ser Ala Arg Phe Arg Tyr Leu Met Gly Glu
165 170 175

Arg Leu Gly Val His Pro Leu Ser Cys His Gly Trp Ile Leu Gly Glu
180 185 190

His Gly Asp Ser Ser Val Pro Val Trp Ser Gly Val Asn Val Ala Gly
195 200 205

Val Ser Leu Lys Asn Leu His Pro Glu Leu Gly Thr Asp Ala Asp Lys
210 215 220

Glu Gln Trp Lys Ala Val His Lys Gln Val Val Asp Ser Ala Tyr Glu
225 230 235 240

Val Ile Lys Leu Lys Gly Tyr Thr Ser Trp Ala Ile Gly Leu Ser Val
245 250 255

Ala Asp Leu Ala Glu Ser Ile Met Lys Asn Leu Arg Arg Val His Pro
260 265 270

Ile Ser Thr Met Ile Lys Gly Leu Tyr Gly Ile Lys Glu Asp Val Phe
275 280 285

Leu Ser Val Pro Cys Ile Leu Gly Gln Asn Gly Ile Ser Asp Val Val

290 295 300

Lys Val Thr Leu Thr His Glu Glu Glu Ala Cys Leu Lys Lys Ser Ala
305 310 315 320

Asp Thr Leu Trp Gly Ile Gln Lys Glu Leu Gln Phe
325 330

<210> 2
<211> 971
<212> DNA
<213> Saccharomyces cerevisiae

<400> 2
aagggtagcc tccccataac ataaactcaa taaaatatat agtcttcaac ttgaaaaagg 60
aacaagctca tgcaaagagg tggtacccgc acgccgaaat gcatgcaagt aacctattca 120
aagtaatatc tcatacatgt ttcatgaggg taacaacatg cgactgggtg agcatatgct 180
ccgctgatgt gatgtgcaag ataaacaagc aagacggaaa ctaacttctt cttcatgtaa 240
taaacacacc ccgcgtttat ttacctatct ttaaacttca acaccttata tcataactaa 300
tatttcttga gataagcaca ctgcacccat accttcctta aaagcgtagc ttccagtttt 360
tggtggttcc ggcttcctic ccgattccgc ccgctaaacg catatttttg ttgcctggtg 420
gcatttgcaa aatgcataac ctatgcattt aaaagattat gtatgctctt ctgacttttc 480
gtgtgatgaa gctcgtggaa aaaatgaata atttatgaat ttgagaacaa ttctgtgttg 540
ttacggtatt ttactatgga ataattaatc aattgaggat tttatgcaaa tatcgtttga 600
atatttttcc gacccttga gtacttttct tcataattgc ataatattgt ccgctgcccg 660
tttttctgtt agacggtgtc ttgatctact tgctatcgtt caacaccacc ttattttcta 720
actatttttt ttttagctca tttgaatcag cttatggtga tggcacattt ttgcataaac 780
ctagctgtcc tcgttgaaca taggaaaaaa aaatatatta acaaggctct ttcactctcc 840

ttgcaatcag atttgggttt gttcccttta ttttcatatt tcttgtcata ttcctttctc 900
aattattatt ttctactcat aaccacacgc aaaataacac agtcaaatca atcaaagatc 960
ccccaattct c 971

<210> 3
<211> 999
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:Modified DNA
coding lactate dehydrogenase

<400> 3
atggctactt tgaaagatca attgattcaa aatttgttga aagaagaaca tgttccacaa 60
aataaaatta ctattgttgg tgttggtgct gttggtatgg cttgtgctat ttctattttg 120
atgaaagatt tggctgatga agttgctttg gttgatgtta tggaagataa attgaaaggt 180
gaaatgatgg atttgcaaca tggttctttg tttttgagaa ctccaaaaat tgtttctggt 240
aaagattata atgttactgc taattctaga ttggttatta ttactgctgg tgctagacaa 300
caagaaggtg aatctagatt gaatttggtt caaagaaatg ttaatatttt taaatttatt 360
attccaaata ttgttaaata ttctccaaat tgtaaattgt tggttgtttc taatccagtt 420
gatattttga cttatgttgc ttggaaaatt tctggttttc caaaaaatag agttattggt 480
tctggttgta atttggattc tgctagattt agatatttga tgggtgaaag attgggtgtt 540
catccattgt cttgtcatgg ttggattttg ggtgaacatg gtgattcttc tgttccagtt 600
tggtctggtg ttaatgttgc tggtgtttct ttgaaaaatt tgcatccaga attgggtact 660
gatgctgata aagaacaatg gaaagctgtt cataaacaag ttgttgattc tgcttatgaa 720
gttattaaat tgaaaggtta tacttcttgg gctattggtt tgtctgttgc tgatttggct 780
gaatctatta tgaaaaattt gagaagagtt catccaattt ctactatgat taaaggtttg 840

tatggtatta aagaagatgt ttttttgtct gttccatgta ttttgggtca aaatggtatt 900
tctgatgttg ttaaagttac tttgactcat gaagaagaag cttgtttgaa aaaatctgct 960
gatactttgt ggggtattca aaaagaattg caattttaa 999

<210> 4
<211> 1052
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:Modified DNA
coding lactate dehydrogenase

<400> 4
acagaattca caatggctac tttgaaagat caattgattc aaaatttgtt gaaagaagaa 60
catgttccac aaaataaaat tactattgtt ggtgttggtg ctgttggtat ggcttgtgct 120
atttctattt tgatgaaaga tttggctgat gaagttgctt tggttgatgt tatggaagat 180
aaattgaaag gtgaaatgat ggatttgcaa catggttctt tgtttttgag aactccaaaa 240
attgtttctg gtaaagatta taatgttact gctaattcta gattggttat tattactgct 300
ggtgctagac aacaagaagg tgaatctaga ttgaatttgg ttcaaagaaa tgttaatatt 360
tttaaattta ttattccaaa tattgttaaa tattctccaa attgtaaatt gttggttgtt 420
tctaatccag ttgatatttt gacttatgtt gcttggaaaa tttctggttt tccaaaaaat 480
agagttattg gttctggttg taatttggat tctgctagat ttagatattt gatgggtgaa 540
agattgggtg ttcatccatt gtcttgtcat ggttggattt tgggtgaaca tggtgattct 600
tctgttccag tttggtctgg tgttaatgtt gctggtgttt ctttgaaaaa tttgcatcca 660
gaattgggta ctgatgctga taaagaacaa tggaaagctg ttcataaaca agttgttgat 720
tctgcttatg aagttattaa attgaaaggt tatacttctt gggctattgg tttgtctgtt 780
gctgatttgg ctgaatctat tatgaaaaat ttgagaagag ttcatccaat ttctactatg 840

attaaaggtt tgtatggtat taaagaagat gttttttgt ctgttccatg tattttgggt 900
caaaatggta tttctgatgt tgttaaagtt actttgactc atgaagaaga agcttgtttg 960
aaaaaatctg ctgatacttt gtggggtatt caaaaagaat tgcaatttta ataactcgag 1020
cttggttgaa cacgttgcca aggcttaagt ga 1052

<210> 5
<211> 100
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 5
acagaattca caatggctac tttgaaagat caattgattc aaaatttgtt gaaagaagaa 60
catgttccac aaaataaaat tactattgtt ggtgttggtg 100

<210> 6
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 6
acagaattca caatggctac 20

<210> 7

<211> 100

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 7

atgataacaa ccacaaccac gacaaccata ccgaacacga taaagataaa actactttct 60

aaaccgacta cttcaacgaa accaactaca ataccttcta 100

<210> 8

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 8

atgataacaa ccacaaccac 20

<210> 9

<211> 100

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 9

tggttgatgt tatggaagat aaattgaaag gtgaaatgat ggatttgcaa catggttctt 60

tgtttttgag aactccaaaa attgtttctg gtaaagatta 100

<210> 10

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 10

tggttgatgt tatggaagat 20

<210> 11

<211> 100

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 11

taacaaagac catttctaat attacaatga cgattaagat ctaaccaata ataatgacga 60

ccacgatctg ttgttcttcc acttagatct aacttaaacc 100

<210> 12

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 12

taacaaagac catttctaat a 21

<210> 13

<211> 100

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 13

tgaatctaga ttgaatttgg ttcaaagaaa tgttaatatt tttaaattta ttattccaaa 60

tattgttaaa tattctccaa attgtaaatt gttggttgtt 100

<210> 14
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 14
tgaatctaga ttgaatttgg t 21

<210> 15
<211> 100
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 15
taacatttaa caaccaacaa agattaggtc aactataaaa ctgaatacaa cgaacctttt 60
aaagaccaaa aggttttta tctcaataac caagaccaac 100

<210> 16

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 16

taacatttaa caaccaacaa a 21

<210> 17

<211> 100

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 17

agagttattg gttctggttg taatttggat tctgctagat ttagatattt gatgggtgaa 60

agattgggtg ttcatccatt gtcttgtcat ggttggattt 100

<210> 18

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 18

agagttattg gttctggttg t 21

<210> 19

<211> 100

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 19

cagaacagta ccaacctaaa acccacttgt accactaaga agacaaggtc aaaccagacc 60

acaattacaa cgaccacaaa gaaacttttt aaacgtaggt 100

<210> 20

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 20

cagaacagta ccaacctaaa a 21

<210> 21
<211> 100
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 21
ctttgaaaaa tttgcatcca gaattgggta ctgatgctga taaagaacaa tggaaagctg 60
ttcataaaca agttgttgat tctgcttatg aagttattaa 100

<210> 22
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 22
ctttgaaaaa tttgcatcca g 21

<210> 23

<211> 100

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 23

agacgaatac ttcaataatt taactttcca atatgaagaa cccgataacc aaacagacaa 60

cgactaaacc gacttagata atacttttta aactcttctc 100

<210> 24

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 24

agacgaatac ttcaataatt t 21

<210> 25

<211> 100

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 25

tatgaaaaat ttgagaagag ttcatccaat ttctactatg attaaaggtt tgtatggtat 60

taaagaagat gttttttgt ctgttccatg tattttgggt 100

<210> 26

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 26

atgaaaaatt tgagaagagt 20

<210> 27

<211> 100

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 27

gacaaggtac ataaaaccca gttttaccat aaagactaca acaatttcaa tgaaactgag 60

tacttcttct tcgaacaaac ttttttagac gactatgaaa 100

<210> 28

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 28

gacaaggtac ataaaaccca g 21

<210> 29

<211> 60

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 29

aaaaaatctg ctgatacttt gtggggtatt caaaaagaat tgcaatttta ataactcgag 60

<210> 30

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 30

aaaaaatctg ctgatacttt g 21

<210> 31

<211> 52

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 31

acgttaaaat tattgagctc gaaccaactt gtgcaacggt tccgaattca ct 52

<210> 32

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 32
acgttaaaat tattgagctc g 21

<210> 33
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 33
atatatggat ccgcgtttat ttacctatct c 31

<210> 34
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 34
atatatgaat tctttgattg atttgactgt g 31

<210> 35

<211> 34

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 35

atatatctcg aggccagcta acttcttggt cgac 34

<210> 36

<211> 31

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 36

atatatgaat tctttgattg atttgactgt g 31

<210> 37

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 37

tggttgatgt tatggaagat 20

<210> 38

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 38

gacaaggtac ataaaaccca g 21

<210> 39

<211> 19

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 39

gtaataaaca caccccgcg 19

5